

## News in Brief

*Park abbreviations are given on page 2*

### Aquatic Monitoring

Staff have analyzed five years of aquatic vegetation data from OZAR springs. Staff presented results on OZAR vegetation and BUFF and OZAR invertebrate and fish monitoring during the Ozark Summit at Big Spring, June 12-14.

Invertebrates — Reports for GWCA, WICR, PIPE and HOME are in progress. We will sample springs at OZAR in July.

Fish — Dry conditions prevented completion of fish monitoring at BUFF at some sites during June. Staff completed fish and invertebrate sampling at PERI. We will sample at HOSP in early July.

### Wetland Monitoring

Field teams delineated and performed quality assessments at CUVA's intensive survey sites (63 wetlands). Next, we will return to the wetlands to setup monitoring plots and groundwater wells. We also began breeding bird surveys and water chemistry measurements at 23 wells. The water level monitoring program now has 19 active volunteers observing water levels up to three times a week.

### Vegetation Monitoring

Plant Community — Staff assisted with breeding bird habitat monitoring at GWCA, PERI and WICR. We began accuracy assessment of the vegetation inventory map for WICR. Staff have assisted cooperators that are working on the next round of vegetation inventory maps for HOCU, HEHO, LIBO and PIPE.

Invasive Plant — The EPMT staff have worked cooperatively with the Conservation Corps of Iowa and park staff to control invasive plants in BUFF, EFMO, GWCA, OZAR, PERI, TAPR and WICR. George Yatskievych, Missouri Botanical Garden, will conduct invasive plant monitoring, beginning in August, at GWCA, PERI, and WICR.

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## What do we mean by data visualization?

Data visualization helps managers understand large datasets that answer a resource question. The investigator conveys an empirically-based answer using graphical techniques that represent findings from large datasets. The graphics should be visually appealing and the meaning should be intuitive.

The Internet and the proliferation of computers has contributed to an accumulation of huge quantities of data. The need to understand this enormous amount of information has driven data visualization. Availability of techniques and increasing biological and environmental data have led HTLN to apply data visualization to inventory and monitoring data.

Statistical and graphics packages or drawings done with computer software can render graphical interpretation of data. Our staff develops graphical representations of monitoring data using *Processing*, a Java-based programming language. *Processing* is object-oriented and has a high level graphics library. Originally built for electronic visual arts design, *Processing* provides immediate visual feedback using a simplified programming model.

Almost all types of data can be graphically represented, including frequency, map, time series and trends, associations between factors, hierarchical and network data. For example, map data are represented in an X, Y and sometimes Z coordinate system. Magnitude of a factor can be represented either on the Z-axis or graphically using colors and symbols. The example combines map data with a Z-coordinate representing the magnitude of a factor (Figure 1).

Palmer Drought Severity Index (PDSI) is a climate-index of drought. Climatologists record PDSI data values, ranging from -4 (dry) to +4 (wet), on a grid across North America. Our staff conducted a cluster analysis to separate highly variable spatial data into homogeneous subgroups within our geographic area. Figure 1 shows clusters from the analysis with vertical bars representing PDSI values for the year 1990. This representation combines map data aspects and a time series of PDSI values with the potential to animate the figure.

Time series and trends data are closely tied with monitoring natural resources. Continuing with the previous example, PDSI is a very large time-series dataset, dating from the mid-1600s to the present. Instrument-based data go back 100 years and proxy data derived from tree-ring chronologies, lake sediments and historical documents contribute to estimating PDSI prior to that instrumentation. Our staff created time-series plots for PDSI values for clusters resulting from the cluster analysis. Drought events were often shared among clusters, while other patterns were essentially random.

Network monitoring projects don't

cover this large span of time, but we search for trends in populations and communities that can graphically show similarities and differences in patterns over time. We can represent tree

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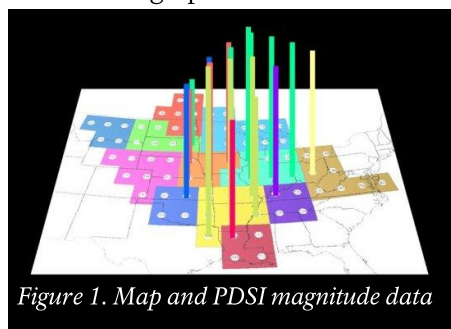


Figure 1. Map and PDSI magnitude data

The Weather Vane is published by the Heartland Inventory and Monitoring Network of the National Park Service. Visit <http://science.nature.nps.gov/im/units/htln/index.cfm>.

... protecting the habitat  
of our heritage



## Nice work EFMO!

Katherine Busse and Jeannette Muller found two new invasive species at Effigy Mounds National Monument. Houndstongue (*Cynoglossum officinale*) does not pose a great ecological threat to native plant communities at this time, but is toxic to cattle, not a problem at EFMO. Black swallow-wort (*Cynanchum louiseae*) is a perennial in the milkweed family that can form large invasions that compete with and exclude native vegetation. Studies indicate that heavy cover of a closely related plant resulted in decreased grassland bird abundance in the study areas. Black swallow-wort poses a significant ecological threat to the plant communities and to breeding bird diversity and abundance at EFMO if not contained or controlled.

The EPMT and park staff will target black swallow-wort for early removal to prevent its spread. As boots hit the ground with plant community monitoring, invasive plant monitoring and invasive plant activities, more people are in the field than before to observe invasive species that are making in-roads into our parks. Identification of and response to invasive species discoveries are what early detection and removal is all about.

Thanks, Kat and Jeannette, for your good eyes and appropriate response.



Photo of *Cynanchum louiseae*, Plant Conservation Alliance's Alien Plant Working Group, <http://www.nps.gov/plants/alien/fact/cylo1.htm>.

edited by Sherry Middlemiss-Brown

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### Wildlife Monitoring

**Breeding Birds** — Park staff/volunteers and HTLN staff conducted bird surveys in all 11 parks that monitor birds. A big thanks goes out to all park staff and volunteers that made this possible. Data are currently being entered into the bird project database.

**Whitetail Deer** — Completed reports for the 2012 monitoring season went out to ARPO, PERI, and WICR. We currently are working with Missouri Department of Conservation (MDC) on data analysis and reporting that leverages field data collected by both MDC and NPS.

### Fire Ecology

We drafted fire reports for GWCA and TAPR. The ecology team traveled to PIPE in May, but the burn was canceled due to wind conditions. The team surveyed woody plants at GWCA in June and will head to EFMO in July with a final summer stop at TAPR in August. Chris is providing botanical assistance to the breeding bird and vegetation monitoring projects this season. Sherry conducted another workshop for the MSU GLADE project in June.

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data or hierarchical data with stem and leaf plots, treemaps or word diagrams. Examples of hierarchical data include taxonomic data, directory and file structures or geographic names.



The visualization above is a treemap of abundance of river invertebrates, based on taxonomic diversity and abundance at a sample site. The visualization to the left demonstrates relative abundance of bird species using a word diagram.

Our HTLN staff have used treemaps to visualize taxonomic abundance of river invertebrates. A treemap consists of a large rectangle containing smaller rectangles, whose area shows the magnitude of individual features. Treemaps of the river invertebrates depict the diversity and abundance of taxonomic groups occurring at a particular sample site.

Data visualization plays an important role in interpretation of massive datasets. It will help park managers to recognize status and trends within and among populations in their parks, and their intuitive design makes them understandable by everyone.

submitted by Gareth Rowell



## Great Plains Fire Science Exchange

The consortium is planning a workshop for the 2013 Society of Range Management meeting in Oklahoma City. Save some travel money for this meeting as there will be plenty of opportunities to learn about fire in rangelands throughout the week. We also are planning a video project where we showcase landowners using fire in the region. Sherry introduced the consortium at the Oklahoma prescribed fire council and WICR All Staff meetings. She also attended an all consortia meeting in Boise. Check out the Facebook page (More on the Web; no log-in needed). Watch for webinar announcements that help you learn without worrying about your travel budget.

submitted by Sherry Leis

## More on the Web

HTLN website: <http://science.nature.nps.gov/im/units/htln/index.cfm>

Interesting website: <http://www.fs.fed.us/ccrc/carboncourse/index.html>

Least Wanted: Alien Plant Invaders of Natural Areas: <http://www.nps.gov/plants/alien/fact.htm>

Great Plains Fire Science Exchange on Facebook: <http://www.facebook.com/GPFireScience>